UNPUBLISHED PRELIMINARY DATA

Magnethohydrodynamic Calculations of The Implosion Phase In A θ-Pinch - A Parametric Study*

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Numerical calculations of the implosion phase in a typical large θ-pinch experiment have been carried out for a wide range of parameters. The two-fluid equations with finite electrical and thermal conductivity coded earlier[1,2], were employed. However, the equations were modified in the case of high densities so that coefficient of the von Neuman shock term can be computed from the ion scattering time. The shock thickness can also be parametrically varied and controls the density distribution far behind the shock "front" providing an indirect method for estimating the shock thickness from experimental data. The initial density distribution is not as critical as might be expected with a reverse bias field because of the expansion of the plasma toward the walls during the reversal of the vacuum field near t=0. Generally speaking, with moderate voltages, long coils and bias fields of a few kilogauss the shock structure is determined by the finite conductivity since the Alfven Mach numbers and ion

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1. K. Hain, G. Hain, K. V. Roberts and S. J. Roberts, Z Naturforsch 15a, 1039 (1960)

2. K. Hain and A. C. Kolb, Salzburg Conf.Nuc.Fusion (in press).

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mean free paths are small. The electron heating is mainly due to field diffusion and compression, and the ion heating due to relaxation with hot electrons and compression. "Shock heating" of ions is not very important for the cases studied.

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